

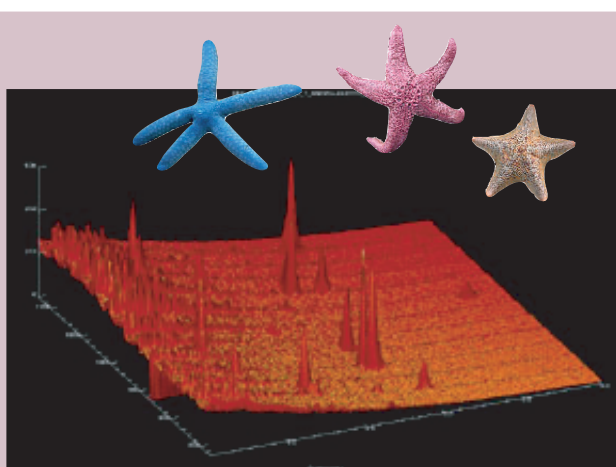
High-Pressure Preferred Orientation Neutron Diffractometer (HIPPO)

The High-Pressure Preferred Orientation (HIPPO) neutron diffractometer is the first third-generation neutron time-of-flight powder diffractometer to be constructed in the United States. It achieves very high neutron count rates by virtue of a short (9 m) initial flight path on a high-intensity water moderator and 1,360 ^3He detector tubes covering 4.5 m² of detector area from 10° to 150° in scattering angles. HIPPO was designed and manufactured as a joint effort between LANSCE and the University of California with the goals of attaining world-class science and making neutron powder diffraction an accessible and available tool to the national user community. Over two orders of magnitude of momentum transfer are available ($0.1\text{--}30\text{ \AA}^{-1}$) to support studies of amorphous solids; magnetic diffraction; small crystalline samples; and samples subjected to extreme environments such as temperature, pressure, uni-axial stress, or magnetic fields. The exceptionally high data rates of HIPPO also make it useful for time-resolved studies. In addition to the standard ancillary equipment (100-position sample/changer, closed-cycle He refrigerator, furnace), HIPPO has unique high-pressure cells capable of achieving pressures of 30 GPa at ambient and high (2000 K) temperature with samples up to 100 mm³ in volume.

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HIPPO frame without detectors.



The diffraction peaks show that starfish exo-skeletons are locally single crystals.

HIPPO Specifications

Performance	
Moderator	Chilled water, high intensity
Resolution and range at 150°	~ 0.4% and $0.12\text{ \AA} < d < 4.8\text{ \AA}$ ($1.31\text{ \AA}^{-1} < Q < 52.4\text{ \AA}^{-1}$)
Resolution and range at 90°	~ 0.8% and $0.17\text{ \AA} < d < 6.9\text{ \AA}$ ($0.91\text{ \AA}^{-1} < Q < 37.0\text{ \AA}^{-1}$)
Resolution and range at 40°	~ 1.5% and $0.35\text{ \AA} < d < 13.9\text{ \AA}$ ($0.45\text{ \AA}^{-1} < Q < 18.0\text{ \AA}^{-1}$)
Resolution and range at 20°	~ 2.6% and $0.65\text{ \AA} < d < 26.1\text{ \AA}$ ($0.24\text{ \AA}^{-1} < Q < 9.7\text{ \AA}^{-1}$)
Resolution and range at 10°	~ 5.0% and $1.20\text{ \AA} < d < 47.5\text{ \AA}$ ($0.13\text{ \AA}^{-1} < Q < 5.3\text{ \AA}^{-1}$)
Primary Flight Path	
Moderator to sample	~ 9.0 m
Incident collimation (at sample)	5–20 mm diameter (round beam)
Secondary Flight Path	
Sample to 150° tube and detector area	~ 1.0 m and 0.93 m ² resolution
Sample to 90° tube and detector area	~ 0.7 m and 1.06 m ²
Sample to 40° tube and detector area	~ 1.0 m and 1.11 m ²
Sample to 20° tube and detector area	~ 1.5 m and 0.99 m ²
Sample to 10° tube and detector area	~ 2.0 m and 0.50 m ²
Secondary Flight Path	
Maximum number of samples (non-texture)	100
Maximum number of samples (texture)	32
Texture tilt angle	-5°–25°
Texture rotation	0°–270°
Sample size (texture)	25 mm diameter
Sample size (non-texture)	9.5 and 6.3 mm diameter

